Materials and Resources

Over 136 million tons of construction and demolition waste are generated each year in the United States. The effect a building has on the environment can be substantially minimized with the efficient use and disposal of building materials. In its simplest form of conservation, LEED looks at the products and materials that are used in building construction and requires that they be used efficiently, conservatively and pragmatically, from specification of recycled material content in design to ensuring the project is managing its waste stream effectively during construction and beyond.

Boulder Community Foothills Hospital
Courtesy: Ed LaCasse Photography

MR Prerequisite 1: Storage & Collection of Recyclables

Storage and collection of recyclables is one of the most basic sustainable strategies. This is a credit that can be integrated creatively, exhibiting the environmental initiatives taken on by the building through signage, pictures and even demonstrations that can contribute to Innovation in Design credits. This credit is achieved with a twofold approach: interior recycling collection areas and storage of recyclables for disposal. Materials recycled must include, at a minimum, paper, corrugated cardboard, glass, plastics and metals.

Helpful Hints:

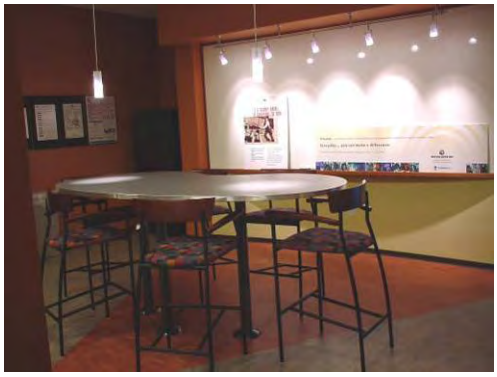
- The building owner should create a recycling plan, if one is not already in use.
- The architect is responsible for designing areas dedicated to recycling according to the owner or tenant's recycling plan and recycling needs.
- Look into local recycling facility availability early on! Provisions may need to be made if local facilities do not accommodate all of the five required materials to be recycled.

Examples:

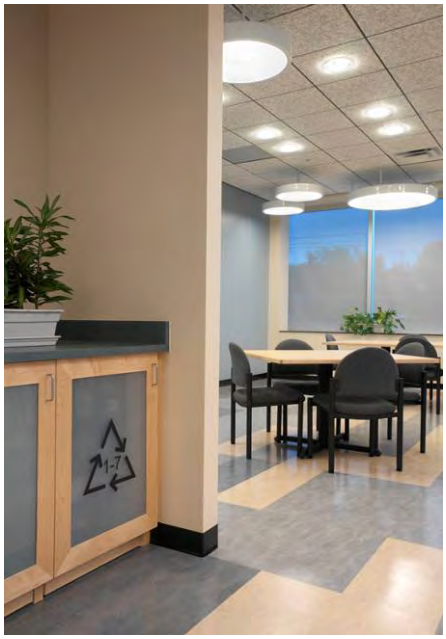
- Boulder Foothills Community Hospital went above and beyond the requirements of this prerequisite and was awarded "Overall Recycler of the Year 2001" by Colorado Recycles. The hospital not only recycles the standard five requirements, but also coordinates recycling of batteries, printer cartridges, furniture/supplies and computers. Additionally, the Maternity Department uses cloth diapers instead of disposables to minimize waste.
- CH2M HILL's facilities staff worked closely with the architect to design an effective system for collection and storage of recyclable materials. As a result, each central coffee room features recycling containers built into the cabinetry. These rooms were also designed as creative work settings that encourage informal meetings and employee interaction.
- Colorado Springs Utilities Laboratory break room uses cabinetry with stylized recycling designs to encourage recycling of aluminum cans, plastics, and other recyclable products.

QUICK FACTS

Implementation: Required.



CH2M HILL Coffee Room
Courtesy: CH2M HILL



Colorado Springs Utilities Laboratory
Courtesy: Ed Lacasse Photography

Resources:

Colorado Recycles
Colorado Recycling Guide
This guide to statewide recycling resources has been prepared as a public service and convenience. It is intended to be a resource to identify recyclers and the materials and products that they accept for recycling.
Website: www.colorado-recycles.org/searchfolder/search.html

Colorado Greening Government
Information for Colorado state government and others for waste reduction and recycling and environmentally preferable purchasing.
Website:
www.colorado.gov/greeninggovernment

Colorado Assocation for Recycling
Information and annual conference promoting increasing the amount and effectiveness of recycling in Colorado.
Website: www.cafr.org/

California Integrated Waste Management Board
Business Waste Reduction
Fact sheets, a resource index, case studies and information on the economic benefits of recycling.
Website: www.ciwmb.ca.gov/bizwaste/

Montgomery County Public Schools
Recycling Program & Recycling Regulations
Example plan put together by MCPS including procedures and a list of materials to be recycled.
Website:
www.mcps.k12.md.us/departments/recycling/regulation.htm

Starting a new LEED-NC project?
All new LEED-NC projects will register under version 2.2 (as of January 2006). Refer to the USGBC for complete information about version 2.2. Also, see Appendix C of this Guide for a quick overview of the changes from version 2.1 to 2.2.

MR Credit 1: Building Reuse

If your project is new construction, with no existing structure, the building reuse credits cannot be pursued. To achieve the first of the three credits, a *minimum* of 75 percent of the existing walls, floors and roof must be reused. The second point requires 100 percent of the walls to be reused and few projects pursue these credits because most projects do not include existing buildings. The third point requires 100 percent shell and 50 percent non-shell reuse. Building reuse may be more readily achievable in urban areas due to a greater selection of existing building stock.

Helpful Hints:

- Renovation and/or expansion projects are applicable to these credits.

Example:

- The North Boulder Recreation Center earned this credit with reuse of 83 percent of the existing facility in its expansion.
- Aspen Skiing Company recycled or reused 86 percent of the materials when it deconstructed the existing building, saving $42,000 in construction costs on the Sundeck Restaurant, certified under LEED version 1.0.

Resources:

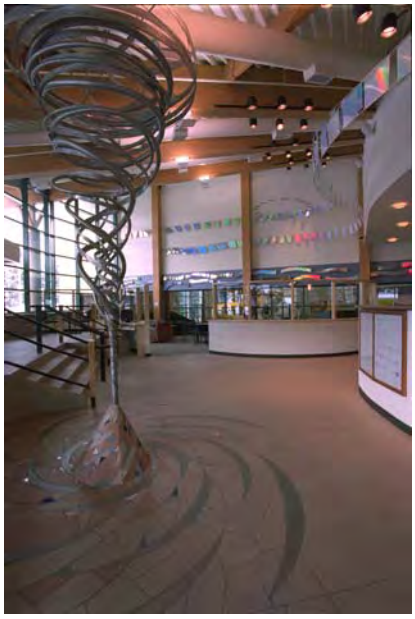
New Life Journal
Article: *Building Recycling: Sustainable Reuse of Existing Structures (April – May 2004)*
Website:
www.findarticles.com/p/articles/mi_m0KWZ/is_5_5/ai_n6175401

QUICK FACTS

Implementation: Worth Considering.

Historical Data:
7% of Colorado LEED certified projects have successfully achieved MRc1.1
0% have earned MRc1.2 or MRc1.3

Aspen Skiing Company Sundeck Restaurant
Courtesy: Paul Morrison



North Boulder Recreation Center
Courtesy: Barker Rinker Seacat Architecture

MR Credit 2: Construction Waste Management, Divert 50% or 75%

Few industries impact the amount of waste generated in the U.S. like the construction process. In the last few years construction waste management has become more commonplace for many Colorado contractors. LEED projects now underway in the Front Range are often able to divert 75 percent of the construction waste. The availability of recycling locations has made this credit readily achievable. Though some projects may still separate recyclables into designated bins, the waste recycling industry is moving toward commingled recyclables. Construction waste recycling should result in a cost savings..

Recommendations:

- Help contractors develop a waste management plan early to ensure best practices from the initial phases of the project.
- Education of subcontractors on recycling practices and established penalties (such as fees) for not following these practices is key to achieving the highest percentage of construction waste diverted from the landfill.
- Incentives, given by the general contractor or owner, to subcontractors for meeting targeted recycling goals can both motivate and benefit all involved.
- The owner may want to consider tying progress payments with the general contractor's progress submittal for tracking waste recycling percentages.
- The general contractor should confirm the waste/recycling hauler is providing weights (in tons) for tracking hauls instead of the standard cubic yard totals.
- Currently, gypsum wall board is the most difficult of all common construction materials to recycle in Colorado. Investigate local agricultural or site recycling opportunities, such as grinding the gypsum and using it as a soil amendment.

QUICK FACTS

Implementation: Strongly recommended.

Historical Data:
86% of Colorado LEED certified projects have successfully earned MRc2.1
14% have earned both MRc2.1 and 2.2.

Poudre School District staggers recycling containers to save space on jobsites.

Helpful Hints:

- Tight project sites, with minimal laydown yards to store equipment and materials, may have difficulty setting up multiple recycling bins on site. Work with the contractor to stagger bins to match construction schedule; for example, drywall recycling bins are not needed until late in the construction process. Alternatively, the project may require additional bins be stored on adjacent lots.
- Specifications and instructions to bidders should include returned waste/leftover product from the project in "Diverted Waste" totals. In other words, if extra cubic yards of concrete (still in the concrete truck) go back to the batch plant, this can be considered diverted waste from the landfill and contribute to the total percentages for this credit.

Examples:

- On the Fossil Ridge High School project, the district diverted the drywall from the landfill by land-applying it as a soil amendment pilot project funded by the EPA.
- The U.S. Department of Transportation project minimized contaminated recycle bins by dedicating a person to weekly reviews and inspections of the bins.

Resources:

Resource Venture
Construction Waste Management Plan Template
The following website provides a basic contractor's template for the Construction Waste Management Plan.
Website:
www.resourceventure.org/rv/publications/building/WasteMgmtPlan.doc

Associated General Contractors of America
Recycle This! (Brochure)
Information on construction waste management, geared towards contractors. This brochure includes case studies, statistics and resources.
Website:
www.agc.org/content/public/pdf/Environmental_Info/recycle_brochure.pdf

NAHB
Construction Waste Management
Background, resources and publications on construction waste management.
Website:
www.nahbrc.org/tertiaryR.asp?TrackID=&DocumentID=2776&CategoryID=1495

Courtesy: Larimer County Landfill

California Integrated Waste Management Board, Construction & Demolition Materials
One of the most thorough websites available, with a large section dedicated to recycling of construction and demolition materials.
Website: www.ciwmb.ca.gov/ConDemo/

RecyclingPlus Program Manual: Best Practices for Construction Site Recycling
The Recycling Plus Program was developed to provide construction companies with a model program for reducing construction waste on your job sites through using the "three R's" – Reduce, Reuse and Recycle. The intent was to create a user-friendly program emphasizing cost-effective methods to minimize waste on the job site and to make sure most of the waste that does occur gets recycled. Modeled after successful job-site safety programs, the program includes a manual and visual aids for training field personnel. Program materials can be customized by incorporating your company name with the Recycling Plus Program logo.
Website: www.cwc.org/wood/wd_htm/CDL96-1rpt.htm

Wastespec
Model Specifications for Construction Waste Reduction, Reuse and Recycling
WasteSpec provides example specification language that enables Specification writers to better understand what sections contribute to construction waste reduction, reuse and recycling.
Website:
www.tjcog.dst.nc.us/regplan/wastspec.htm

Whole Building Design Guide
Construction Waste Recycling Database
Guide to companies that recycle construction waste, searchable by material and location.
Website: www.wbdg.org/tools/cwm.php

MR Credit 3: Resource Reuse, Specify 5% or 10%

This credit is more difficult to achieve due to the required percentage thresholds (5 to 10 percent of the building material cost) with reused materials. Also, architects often prefer not to reuse materials with unknown histories or voided warranties. As reuse centers become more commonplace and Internet-based materials databases and tools, make finding reused materials that fit a project's needs an easier task, the possibilities of incorporating reused materials into a project continue to grow.

Recommendation:

- This can be a great credit for projects with high-end or large wood-based interior finishes such as residential projects.

Helpful Hints:

- Be sure to distinguish the requirements of this credit from the *Building Reuse credit*. The LEED Reference Guide specifies that "Materials salvaged during a building renovation…that will be reinstalled to serve in their original function must be applied to MRc1". This is a key component to keep in mind when an existing building and components are being reused.

QUICK FACTS

Implementation: Worth considering.

Historical Data:
14% of Colorado LEED certified projects have successfully earned MRc3.1
7% have earned both MRc3.1 and 3.2.

Resources:

City of Boulder
Building Materials Reuse and Recycling Contacts
A spreadsheet of building materials reuse and recycling contacts includes materials and location; and specifies pick-up, acceptance and fees.
Website: www.ci.boulder.co.us/environmentalaffairs/green_points/resources.html

GreenSage
Assistance locating reclaimed wood products, connections to resellers to recycle materials.
Website: www.greensage.com/06064-reclwood.html

U.S. Department of Agriculture (USDA)
The USDA published a directory in 2005 that lists companies involved in wood-framed building deconstruction, dismantling and reused building materials; with an emphasis on those that use, resell and/or re-manufacture salvaged wood.
Website: www.fpl.fs.fed.us/documnts/fplgtr/fpl_gtr150.pdf

Center for ReSource Conservation
The Center for ReSource Conservation' projects include Resource 2000 in Boulder and Resource Fort Collins. Both locations salvage used building materials and resell them at economical prices.
Boulder Website: www.resource2k.org/
Fort Collins Website: www.resourceftcollins.org/

MR Credit 4: Recycled Content, Specify 5% or 10%

Obtaining both Recycled Content credit 4.1 (for 5 percent recycled content) and 4.2 (for 10 percent) is easily achievable for most projects in Colorado. This is a direct result of evolving industry processes that allow recycled content in many building materials. Because this credit is based on a percentage of your total building materials cost, your most expensive items will be the largest contributors for this point. In the project specifications, require post-consumer or post-industrial recycled content for the top five or ten most expensive items in the project. This will ensure purchase of building materials with the highest possible recycled content, and greatly streamline the process for achieving these credits.

Recommendation:

- Target high-dollar items early in the project to include recycled content in the specifications.
- Products that often inherently contain recycled content include steel, drywall, concrete and carpet backing.

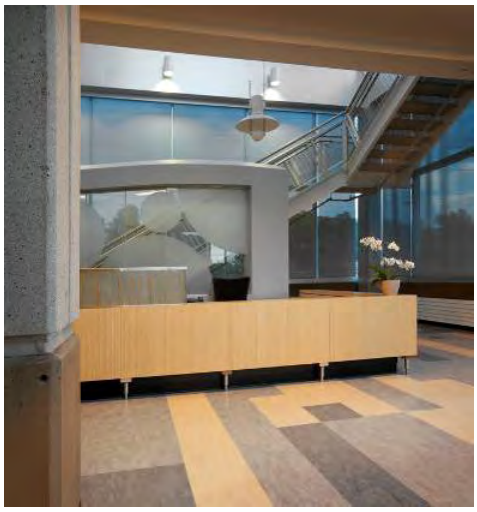
Helpful Hints:

- Only CSI Divisions 2-13 are considered for this credit.
- Contractor documentation and supporting submittals are critical to successfully achieving these credits.
- Document, document, document! Several LEED document submittals have been delayed because of difficulty getting documentation from the contractor. It is much more difficult to go back and dig up records after the project is built than at the time of construction submittals.
- Numerous Colorado projects have doubled the second threshold for this credit (10 percent) and also achieved an Innovation in Design credit.

QUICK FACTS

Implementation: Strongly recommended.

Historical Data:
79% of Colorado LEED certified projects have successfully earned MRc4.1.
71% have earned both MRc4.1 and 4.2.



Colorado Springs Utilities Laboratory is one of several Colorado projects to have earned both Recycled Content credits 4.1 and 4.2
Courtesy: Ed Lacasse Photography

Resources:

USGBC Colorado Chapter
Colorado Chapter LEED Materials Matrix
The Colorado Chapter of the USGBC offers this regional products list as a free download. Each entry contains company contact information and information about LEED credit attributes: locally-manufactured, locally-harvested, recycled content, rapidly renewable and certified wood.
Website: www.usgbc.org/chapters/colorado/regional_products_list.asp

California Integrated Waste Management Board
Recycled Content Product (RCP) Directory
Lists thousands of recycled products and provides information on companies that reprocess, manufacture and/or distribute these products.
Website: www.ciwmb.ca.gov/RCP/

U.S. Environmental Protection Agency
Comprehensive Procurement Guidelines
A list of designated products and the accompanying recycled-content recommendations along with a supplier database which includes manufacturers, vendors and suppliers for each item.
Website: www.epa.gov/cpg/products.htm

Whole Building Design Guide
Federal Green Construction Guide for Specifiers
Comprehensive guide for procuring green building products and construction services. Sample specification language by CSI division. Developed by a partnership between EPA, Federal Environmental Executive and the Whole Building Design Guide.
Website: www.wbdg.org/design/greenspec.php

MR Credit 5: Local/Regional Materials

The local regional materials credits are composed of two points; the first for 20 percent locally manufactured materials, and the second for locally harvested (or mined) materials. Like the recycled content credits, achieving the local/regional materials credits can be streamlined by pinpointing high-dollar materials and listing Colorado manufacturers and harvesting locations in the specifications. For instance, gypsum board can be found both manufactured and harvested locally; however, most wood products (though they may be manufactured locally) come from the Pacific North West.

Recommendation:

- Target high-dollar items early in the project to include local manufacturers and/or harvesting in the specifications.
- Colorado regional products that are *both manufactured and harvested* include (but are not limited to) drywall, ceramic tile, concrete components and limestone.

Helpful Hints:

- Only CSI Divisions 2-13 are considered for this credit.
- Projects can specify preference for products from the manufacturing facility closest to the project site.
- Document, document, document! Several LEED document submittals have been delayed because of difficulty getting documentation from the contractor. It is much more difficult to go back and dig up records after the project is built than at the time of construction submittals.
- Like MRc4, numerous Colorado projects have doubled the required thresholds for this credit and achieved an Innovation in Design credit.

Example:

- Colorado Department of Labor & Employment earned this credit and innovation credits for significantly exceeding the requirements for recycled content and locally manufactured materials. Specifying local and recycled content of structural steel was a key factor in this success.

QUICK FACTS

Implementation: Strongly recommended.

Historical Data: 100% of Colorado LEED certified projects have successfully earned both MRc5.1 and 5.2.

Colorado Department of Labor & Employment structural steel has recycled content and was manufactured locally
Courtesy: Colorado Department of Labor & Employment

Resources:

USGBC Colorado Chapter
Colorado Chapter LEED Materials Matrix
The Colorado Chapter of the USGBC offers this regional products list as a free download. Each entry contains company contact information and information about LEED credit attributes: locally-manufactured, locally-harvested, recycled content, rapidly renewable and certified wood.
Website: www.usgbc.org/chapters/colorado/regional_products_list.asp

AIA Colorado
Sustainable Design Resource Guide
AIA Colorado offers a guide organized according to the sixteen divisions of the Construction Specifications Institute (CSI). Each division is prefaced by an introduction that outlines specific concerns related to the products and systems in that division. This is followed by product listings and information designed to help purchase or specify sustainable building products. (1997)
Website: www.aiacolorado.org/SDRG/home.htm

MR Credit 6: Rapidly Renewable Materials

Like the resource reuse credit, using rapidly renewable materials can be difficult to achieve due to the required threshold of 5 percent of the cost of all building materials and products. This credit is also difficult because it generally comes with a cost premium for renewable materials. However, use of rapidly renewable materials poses the opportunity to showcase the sustainable practices of the project. Visible characteristics such as bamboo or cork flooring can create a marketing edge.

Recommendation:

- Like the resource reuse credit, projects with high-end interiors or residential applications have a great opportunity to find creative ways to use renewable materials. Consider wheat board cabinetry, stained cork floors in a lobby or recycled paper countertops.

Helpful Hints:

- Ensure application of renewable materials is appropriate. For example, wheat board may have a rough finish and be a problem with splinters, depending on specifications and placement.
- Projects can specify preference for products from the manufacturing facility closest to the project site.

Example:

- Although no LEED-NC projects have achieved this yet in Colorado, Boulder Associates did achieve the Rapidly Renewable credit in a LEED-CI project – the interior finish of the Boulder Associates office. This credit is more readily achievable for interior projects, as few exterior products are rapidly renewable.

Resources:

USGBC Colorado Chapter
Colorado Chapter LEED Materials Matrix
This regional products list is offered as a free download. Each entry contains company contact information and information about LEED credit attributes: locally-manufactured, locally-harvested, recycled content, rapidly renewable, and certified wood.
Website: www.usgbc.org/chapters/colorado/regional_products_list.asp

QUICK FACTS

Implementation: Worth considering.

Historical Data: 0% of Colorado LEED certified projects have successfully earned this credit.

Boulder Community Foothills Hospital uses linoleum flooring, a rapidly renewable material
Courtesy: Boulder Associates, Inc.

California, Division of the State Architect
Article: *Sustainable Schools- Rapidly Renewable Materials*
This article includes information on the use of rapidly renewable materials in schools, including links to featured resources.
Website: www.sustainableschools.dgs.ca.gov/SustainableSchools/sustainabledesign/materials/rapidlyrenewablematerials.html

Build It Green
Materials Database
This nonprofit organization provides a material resource database including many sustainable building material listings for products all over the country.
Website: builditgreen.org/guide/

MR Credit 7: Certified Wood

Fifty percent of the total wood budget must be dedicated to Forest Stewardship Council (FSC) certified wood in order to achieve this credit; so needless to say, projects with a minimal wood budget can often achieve this credit more easily than projects with large wood budgets. Wood scopes that may contribute to this credit include formwork (owned, not rented), permanent wood shoring, rough carpentry, finish carpentry, doors and door cores, millwork, telephone backer boards and temporary construction, to name a few. In recent years, the cost premiums for certified wood have decreased dramatically, except for rare species.

Recommendations:

- Minimize the need for fire-treated FSC wood by substituting metal strapping for all interior blocking/backing.
- Confirm lead time for any and all FSC materials; this has potential to impact the project schedule.
- Confirm all FSC suppliers can provide the required documentation, e.g. chain-of-custody certificate numbers.

Helpful Hints:

- Though cost premiums for certified wood have often scared projects away from this credit in the past, numerous LEED registered projects in the Front Range area are finding this credit to be cost-effective and achievable in recent years.
- Don't forget large wood scopes like wood shoring can completely eradicate the possibility to get this credit if not FSC certified!
- This credit has synergies with EQc4.4, composite wood.
- Blocking/backing or other fire-retardant materials may be more challenging to find as FSC certified.
- Document, document, document! Several LEED document submittals have been delayed because of difficulty getting documentation from the contractor. It is much more difficult to go back and dig up records after the project is built than at the time of construction submittals.

QUICK FACTS

Implementation: Strongly recommended.

Historical Data: 0% of Colorado LEED certified projects have successfully earned this credit.

Resources:

Forest Certification Resource Center
Certified Products
List of FSC certified wood sources; searchable by building material. The Center also provides information on forest management and product certification worldwide.
Website:
www.certifiedwoodsearch.org/SearchProducts.aspx

Scientific Certifications Systems, Inc.
Through its Chain-of-Custody Certification Division, SCS certifies wholesalers, manufacturers, distributors and retailers, who handle wood coming from forests certified according to FSC standards. Includes links to a current list of companies certified for Chain-of-Custody.
Website:
www.scscertified.com/forestry/forest_coc.html

Build It Green
Fact Sheet
This nonprofit organization provides a material resource database including many sustainable building material listings for products all over the country. This link provides direct access to an FSC certified wood fact sheet.
Website:
builditgreen.org/resource/index.cfm?fuseaction=factsheet_detail&rowid=12

USGBC Colorado Chapter
Colorado Chapter LEED Materials Matrix
The Colorado Chapter of the USGBC offers this regional products list as a free download. Each entry contains company contact information and information about LEED credit attributes: locally-manufactured, locally-harvested, recycled content, rapidly renewable, and certified wood.
Website:
www.usgbc.org/chapters/colorado/regional_products_list.asp